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Case Report

Suppuration in the adult Lincoln's highway-surgeon's dilemma

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ABSTRACT

The carotid sheath enclosing the common carotid artery, internal jugular vein, vagus and the deep jugular lymph nodes continues around the vessels of the superior mediastinum. This sheath formed by the investing fascia, prevertebral fascia and the pre-tracheal fascia is captioned the Lincoln s highway. Suppurative pathology of the Lincoln highway presents as a vertical swelling at the anterior border of the sternomastoid. USG, CT and MRI confirms the diagnosis and prompts surgical intervention and thus prevents intra thoracic spread with its morbidity and mortality.

Keywords: Carotid space, Lincoln highway, Suppuration

INTRODUCTION

The para-carotid lymphatic chain localizes the infection but often results in a suppurative collection. The latter may be walled off and just present as a suspicious bulge on the side of the neck or appear as a fiery red tender swelling with spikes of fever and malaise. This vertical collection of purulent material. i. e., necrotic amalgam of the invaders, the bacteria usually, the defenders i.e., the sub types of the leucocytes and the lymphoid tissues, usually retains its supra-clavicular location. Reduced immunity is likely to lead to infra-clavicular descent with consequent mediastinitis with its worrisome morbidity and mortality. The parallel routes of spread on either side of the carotids, enclosed by the carotid sheath, from the pharyngo-maxillary space superiorly to behind the sterno-clavicular joint inferiorly were named the Lincoln's highways by Mosher.[1] The Lincoln highway is the longest tollfree highway joining the Atlantic with the Pacific in the US.[2] We report an intriguing case of isolated non-odontogenic carotid space abscess in a 17-year-old juvenile with its management.

CASE REPORT

A 17-year-old young boy was referred to our tertiary care centre with, a diffuse painful neck swelling on the left side of the neck accompanied by fever, and progressive odynophagia for the last 7 days (Figure 1 A and B). There was no history of any dental or tonsillar infection which was a corroborated on dental cross consultation. Preoperative TLC was 19.4 (10×3 u/l), neutrophils 94.7%, lymphocytes 3.9%. Monocyte 1.2%, eosinophil 0.1%, Hb 12.0 mg/dl and platelets 437 (10×3 u/l). Contrast enhanced computed tomography (CECT) revealed a suppurative collection with thick peripheral contrast enhancement adjacent to carotid artery in the carotid sheath. It was 7 cm in vertical height, 4.2 cm in width and 5 cm in anterior-posterior dimension. The collection was extending anteriorly along the sternocleidomastoid. A component was seen insinuating posterior to the muscle at C5 level. There was evidence of thick-walled air containing collection in the left parapharyngeal space extending laterally to the submandibular space reaching the subcutaneous plane.

Rests of the planes were well delineated, (Figure 2-4). Under general anesthesia he was taken up for cervical exploration. A transverse incision was given at the level of the hyoid and superior and inferior subplatysmal planes were developed (Figure 5). The external jugular was identified and the investing fascia was opened anterior to the sternomastoid muscle. The carotid sheath was then longitudinally incised and a purulent collection was drained out (Figure 6). Index finger digital probing was undertaken to break the loculi anterior to the sternomastoid (Figure 7). The inferior limit of excavation was just proximal to the sternoclavicular joint. An inferior 2 cm dependant skin incision was given to facilitate gravity drainage of the secretions. Superiorly the extent of dissection was till the posterior belly of the digastric muscle. The discharge was sterile on culture and sensitivity. The Lincolns highway was thus entirely cleared off, the suppurative collection by laterally retracting the sternomastoid muscle. (Figure 8 A and B). Post operative on the 7th day TLC was 8.4 (10×3 u/l), neutrophils 76%, lymphocytes 16%. monocyte 5.7%, eosinophil 1.9%, Hb 12.4 mg/dl and platelets 283 (10×3 u/l). Daily hydrogen peroxide and povidine iodine dressings were carried out. Patient was put on iv antibiotics Inj. Piptaz 4.5 gm 8 hourly, injection Metrogyl 100 ml 8 hours, injection Magnex forte 1.2 gm 12 hour. along with analgesics and anti-inflammatory medications.

Figure 1 (A and B): Anterior view-Swelling on the entire left lateral side of neck. Lateral view-Swelling on the entire left lateral side of neck.

Figure 2: CT scan Coronal view. Collection in the left para-carotid space, (White arrow).

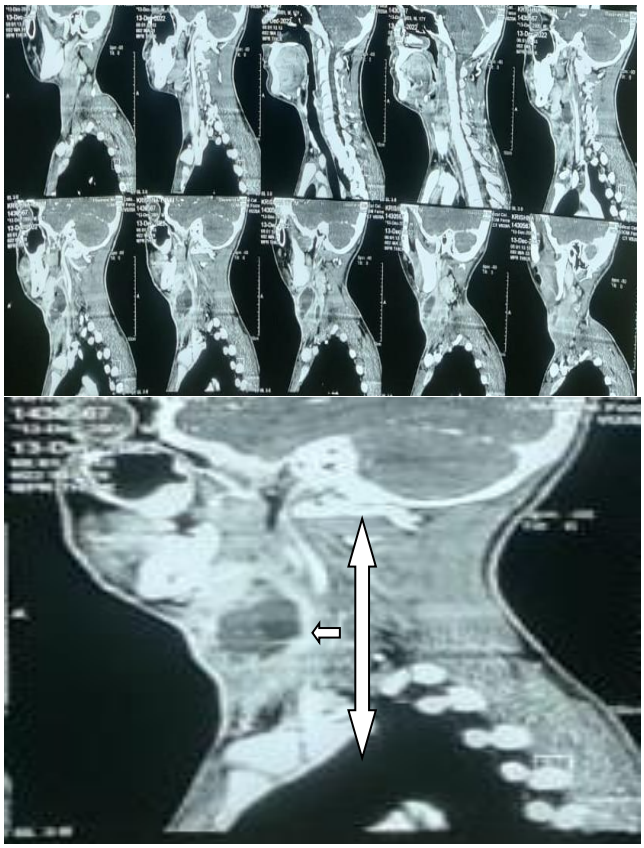

Figure 3: CT scan Sagittal view-Collection in the left para-carotid space, (White arrow-double ended).

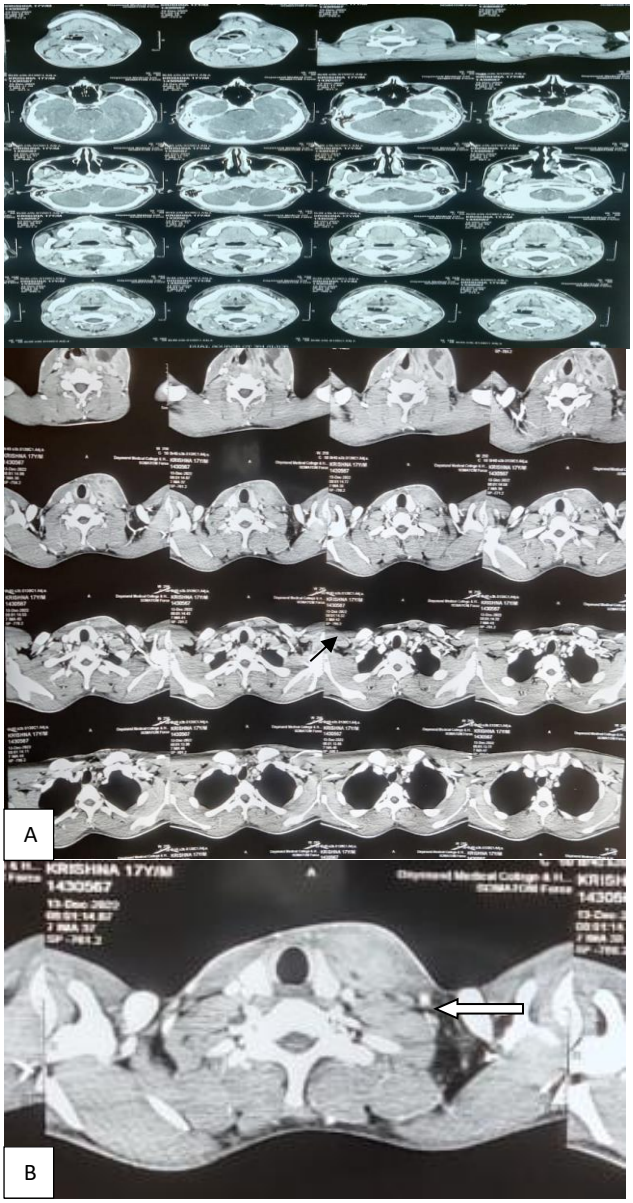

Figure 4 (A and B): CT axial view-Collection in the left para-carotid space. CT axial view-Collection in the left para-carotid space (White arrow).

Figure 5: Transverse cervical incision at level of hyoid.

Figure 6: Purulent collection drained out from left para-carotid space, anterior to sternomastoid muscle.

Figure 7: Index finger digital probing to break the loculi anterior to the sternomastoid.

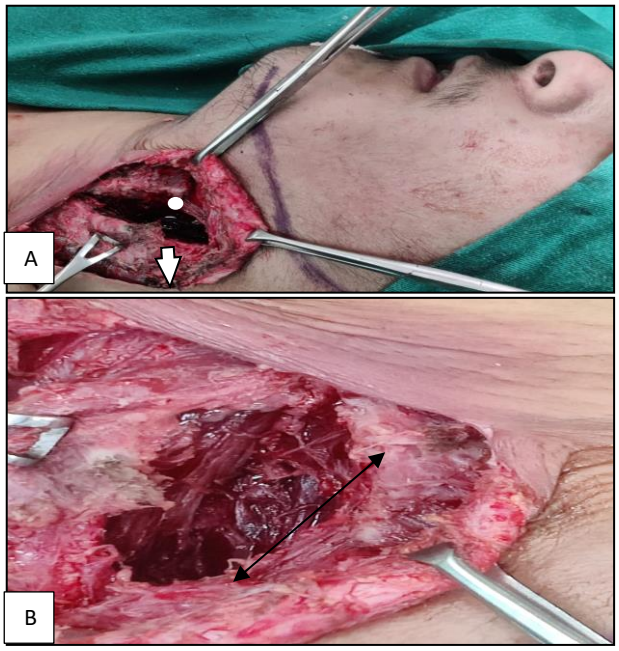

Figure 8 (A and B): The Lincoln s highway post evacuation of suppurative collection (White dot). Laterally retracted sternomastoid muscle (White arrow). The Lincolns highway (Black double ended arrow).

On day 10 healthy granulation tissue was achieved after twice a day daily dressing (Figure 9 A). Incision site was then sutured after creating superior and inferior advancement flaps, over an indwelling drain, (Figure 9 B).

He was relieved on oral medication.

Figure 9 (A and B): Healthy granulation tissue after twice a day daily-dressings. Incision site sutured after creating superior and inferior advancement flaps over an indwelling drain.

DISCUSSION

The carotid sheath enveloping the major neurovascular bundle of the neck is akin to a roundabout where three roads converge 'Here the 3 deep cervical fascial layers, i.e., pretracheal antero-medially, prevertebral posteriorly and the investing antero-aterally unite to form this sheath (Figure 10) Mosher as early as 1929 captioned this cervical compartment as the Lincolns Highway, which was the longest American highway of his era (Figure 11 A and B).[3] The common carotids ,internal jugular veins,Vagi and the lymph node groups are the contents on either side of the neck. Pathologies of any of these manifests as a bulge in the carotid triangle of the neck. Aetiogically they may be categorized as, congenital, inflammatory, neoplastic and traumatic. Among the inflammatory are thrombophelibitis of the internal jugular vein which is noted in unsterile intravenous injections in drug users.[4] Suppuration occurs in the chain of nodes encircling internal jugular vein. Latter may be of non-odontogenic or of odontogenic origin, Infections of the oro-paharynx-tonsils predominate in pediatric population while of the dentition, in adults.[1,5] Suppuration in this space can occur in laryngocoeles, branchial cysts, thymic cysts, thyroids, post thyroidectomy and foreign body traumatic pharyngo-oesophageal lacerations.[6] Isolated collection of pus in this visceral carotid with untraceable etiology is quite rare with as high as 50% incidence as reported by Wright et al.[5] Localised tender swelling with off and on fever uneasiness in the throat. Change in voice and odynophagia are noted with progression. The clinical features are attributed to those arising from primary site and those due to this space involvement. Ultrasonography and imaging modalities, CT/MRI depending on availability, compliance and affordability best delineate the extent of the abscess. A necrotic inner hypo echoic/ hypo dense region with an enhancing hyper vascular peripheral rim are presentations that clinch the diagnosis. Obliterated adjoining tissue planes are suggestive of associated cellulitis. MRI and CT either can be advised though CT is the most accepted modality.[7] MRI better exhibits vessel wall lesions like venous thrombophlebitis and stenosis of the carotids. Aerobic and anaerobic organisms are notorious for causing these abscesses. Alpha and Beta haemolytic *Streptococci* and *Staphylococcus aureus, fusobacterium nucleatum,* bactericides, *Pepto streptococci* and *Neisseria* species are often cultured from the collections in various combinations.[8] Anaerobic collection and culturing needs special media thus often they are not seen. Nowadays (CA-MRSA) community acquired-methicillin resistant *Staphylococcus Aureus* infections have been reported in the paediatric age group with rising morbidity.[9,10] The "Lincoln's highway", is the transit route of a parapharyngeal suppuration to in its infra clavicular descent into the mediastinum though medistinitis is common in a retropharyngeal abscess as it communicates more freely with superior mediastinum.[1] Due to their potential to land up in fulminant medistinitis with a high mortality, deep fascial cervical infections necessitate an early diagnosis and surgical intervention.[11] Ascending internal jugular vein, sigmoid, transverse sinus thrombosis, meningitis, septic pulmonary emboli and carotid artery blow out are other rare untoward sequel of untreated abscesses of this space.[12] Surgical drainage is indicated as an early procedure in the presence of any suppurative infection of the neck. DS Sethi deep neck infection series, reported complication rate to be 19%. Necrotizing cervical fasciitis, aspiration pneumonia, and acute myocardial infarction were too seen.[13]

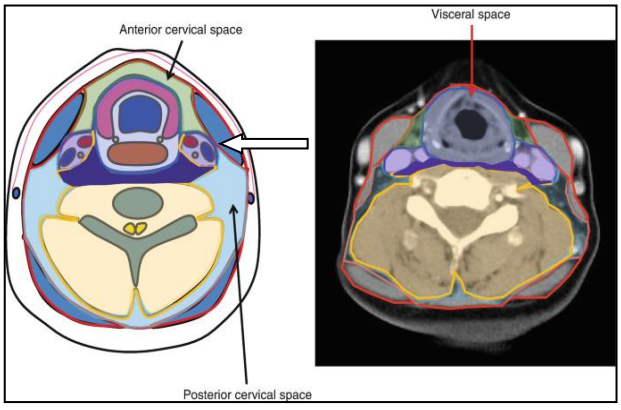

Figure 10: Carotid space (white arrow) neck space anatomy.[14]

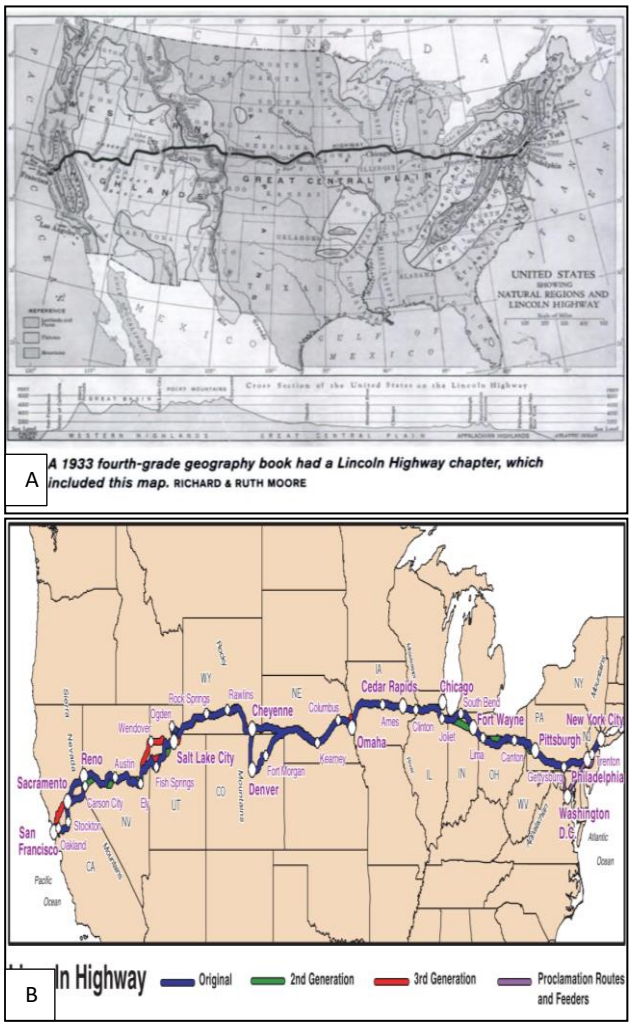

Figure 11 (A and B): The Lincoln highway.[2]

In our patient there was a localized abscess in the Lincoln s highway with no definite finding indicative of any dental or tonsillar likely site of origin. Though there was history of slight malaise following excessive intake of hot and cold fluids at social gatherings in the recent past. This might be a subclinical infection with probably a pharyngeal route of entry. The infection might have got localized in the lymph nodes around the internal jugular nodes that later became necrotic. Clinical picture and CT imaging clinched the diagnosis of carotid space suppuration. We gave a horizontal incision in the skin crease and raise superior and inferior flaps exposing the entire sternomastoid muscle and then opened the investing fascia to reach the carotid sheath. This approach differed from the conventional where an oblique is given in both the skin and investing fascia planes. This in our opinion often heals with a prominent scar as we cut through the collagen, Langer lines of skin tension.[15] The culture sensitivity of the collection showed no growth probably either it was necrotic tissue with no viable organisms or the collection media and procedure was not proper. Timely surgical intervention in the neck prevented further intra thoracic spread.

CONCLUSION

Abscesses of the Lincoln highway are not so common in the present antibiotic era. A longitudinally oriented bulge parallel and anterior to the sternomastoid suggests likewise. Imaging corroborates the same and timely surgical intervention is the ideal therapeutic modality.

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